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Russell Vare, Dir Bus Dev, russell@nuvve.com

Nuvve Overview

- The world's only platform enabling profitable deployment of EV fleets globally
- University of Delaware Spin Off
- HQ in San Diego, CA
- Offices in Copenhagen, London, Newark (DE), Paris
- 33 Employees
- Core IP: 15 patents filed or pending
- Projects on 5 continents
- 3+ years of full commercial operation in Denmark on FR markets
- Corporate investors
  - EDF Renewable Energy
  - Toyota Tsusho

Awards:

V2G / VGI


Barcelona, Spain

EVS32 Lyon, France


Culver City, CA

London, UK

UCSD, San Diego CA


Newark, Delaware

Corsica, France

Torrance, CA

El Cajon, San Diego CA


Manila, Philippines


Nagoya, Japan

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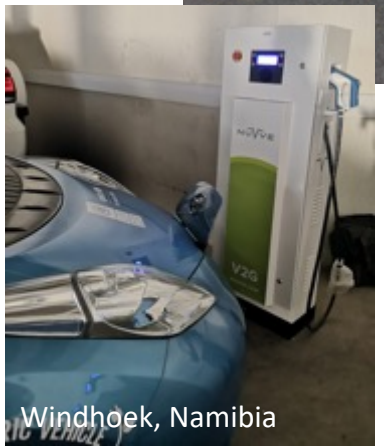
CDG Airport, Paris



Windhoek, Namibia

White Plains, NY


Nice, France

Frederiksberg, Denmark

V2G Benefits

1. Reduces the cost of Electrification of Transport
2. Defers investment in Grid Infrastructure
3. Contributes to reducing CO2 and pollution from vehicles and power plants
4. Supports additional Renewable Energy sources on the grid

V2G Services Delivered at all Grid Levels

Utility & Distribution Services

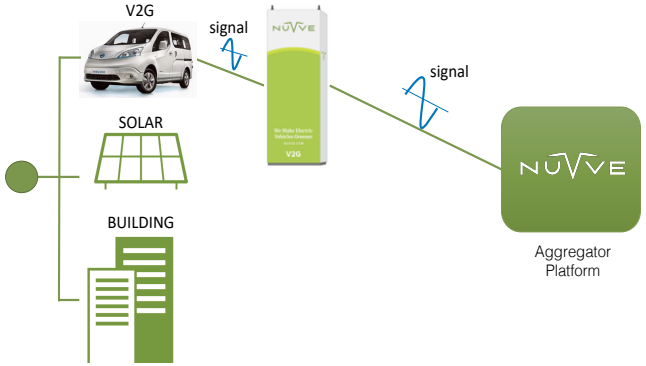
El Cajon, California

- Renewable Energy Time Shifting
- Renewable Energy Capacity Firming
- Demand Response & Curtailment

- Spot Price Optimization
- GHG signal
- Blackout support

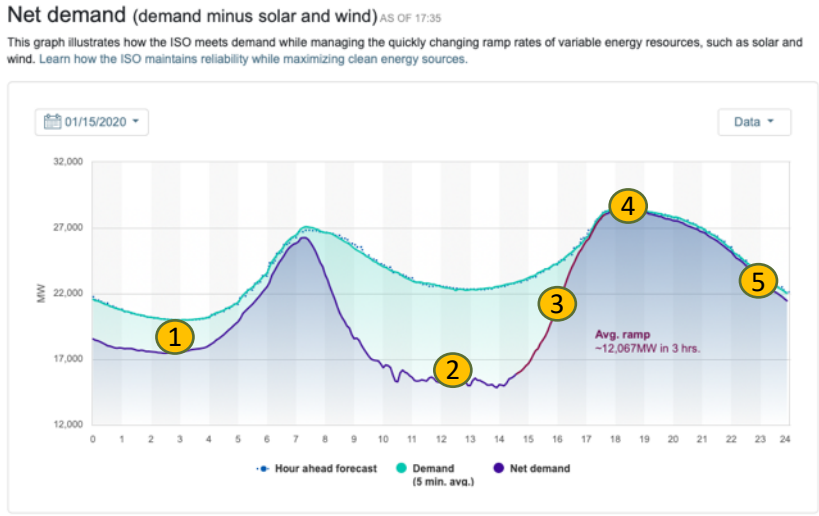
Building Energy Optimization

Nuvve V2G in Barcelona



- Building Load time shift
- Charging optimized for solar
- Avoid Demand Charges
- Load Balancing

System Wide Grid Services



System wide V2G Grid Services:

1. Charging EVs during the night when capacity is available
2. Charging EVs during the day with renewable energy
3. Diminish ramp rate
4. Restituting Energy from V2G during peaks
5. Providing Stability Services (Ancillary, DR, Frequency Reg.)

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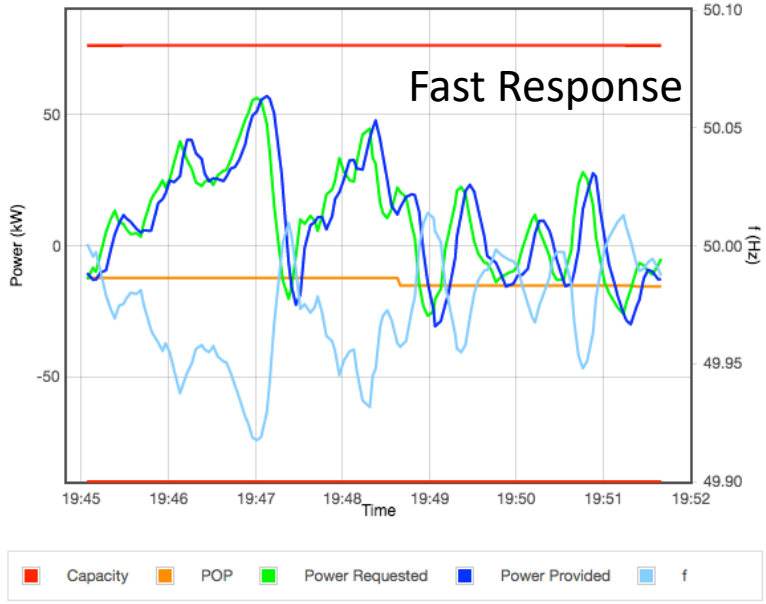
Frequency Regulation, 3.5 years of non-stop operation

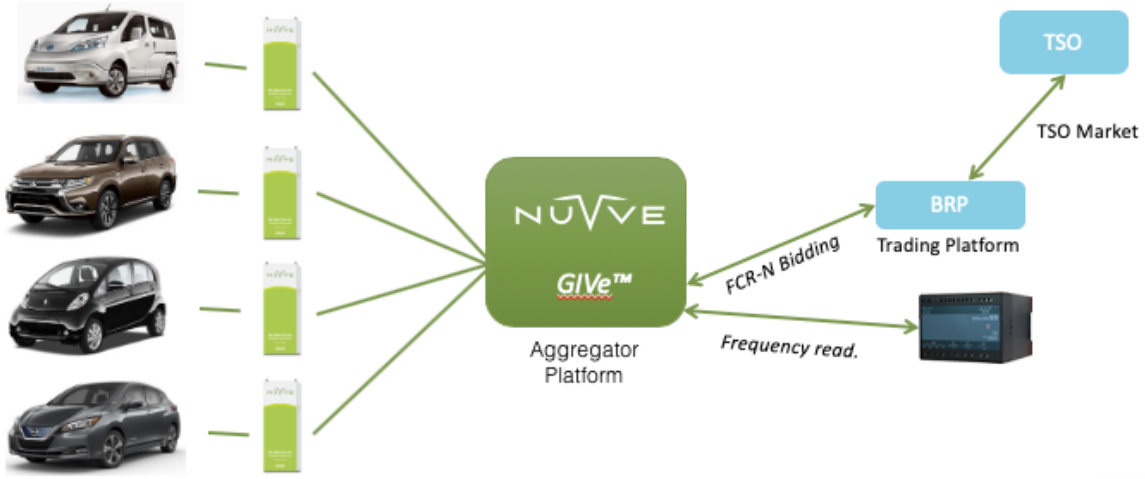


- Operational in September 2016 in partnership with TSO
- 43 V2G chargers are operating in east Denmark

Each vehicle generated **$ 2070** of market participation revenue over 2017-18

- High wind generation on grid (55%)

- In the USA, Nuvve is providing FR to PJM in Delaware



Nuvve's School Bus Deployments

Torrance USD V2G Pilot

Con Edison V2G Pilot

Napa Valley USD V2G Pilot

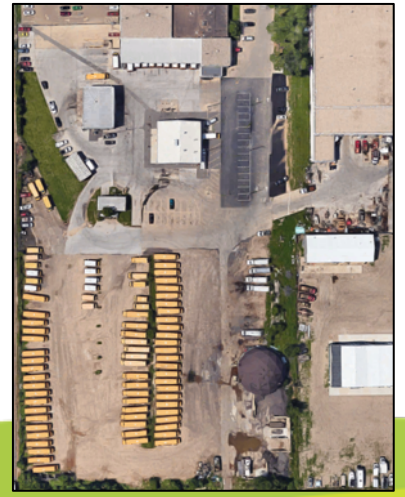
Cajon Valley USD V1G

District selected for $9.75M grant to promote zero-emission vehicles, clean transportation options

Posted: Wednesday, January 8th 2020

San Diego Unified will be receiving a big boost to its environmental leadership efforts, thanks to a new grant from the California Air Resources Board (CARB).

San Diego USD V2G project



Central Illinois Bus to Grid Initiative

West Coast DC V2G Pilot under development Q4 2020

East Coast DC V2G Pilot under development Q3 2020

Rialto USD 150kW DC-V2G DOE pilot 2021

NUVVE

New school bus economy thanks to V2G

- Dominion Energy in Virginia, announces 1050 School bus to be purchased as GRID ASSETS, because they are V2G enabled.

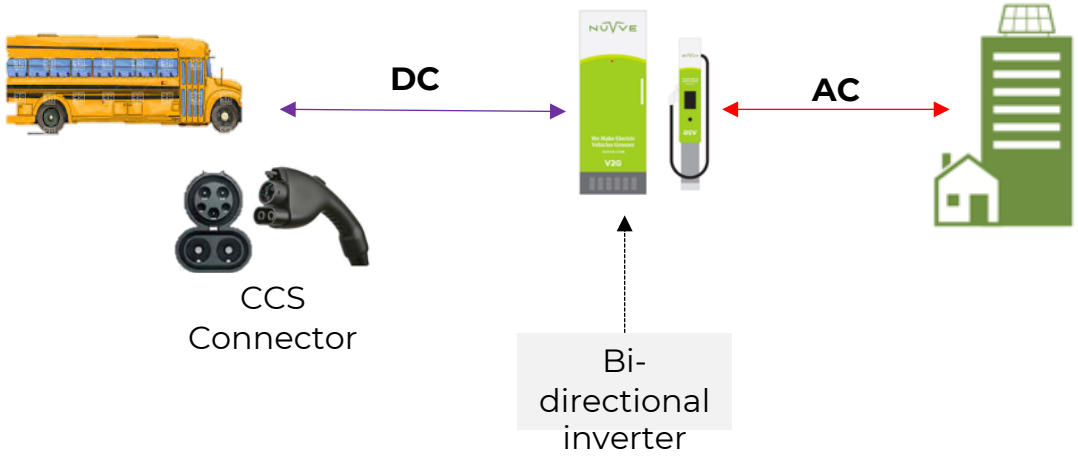
- Schools no longer need to have large capital expense budget for buses.
- Electric buses become more affordable.
- This accelerates transition from Diesel to Electric.
- Ensures access to clean transportation for all

V2G: AC vs. DC Configuration

AC-V2G (J1772)

Description	Power conversion <u>on-board</u> the vehicle
Advantages	Simple: <u>cheaper</u>, smaller, lighter, and easier to install
Disadvantages	Utility interconnection process is more <u>complicated</u> due inverter on vehicle

DC-V2G (CCS)



Description	Power conversion <u>off-board</u> the vehicle
Advantages	Interconnection process is <u>straight forward</u> as inverter is off-board
Disadvantages	Station and installation is more <u>expensive</u> than AC charging stations

Example: Torrance School Unified District

Status: Deployed

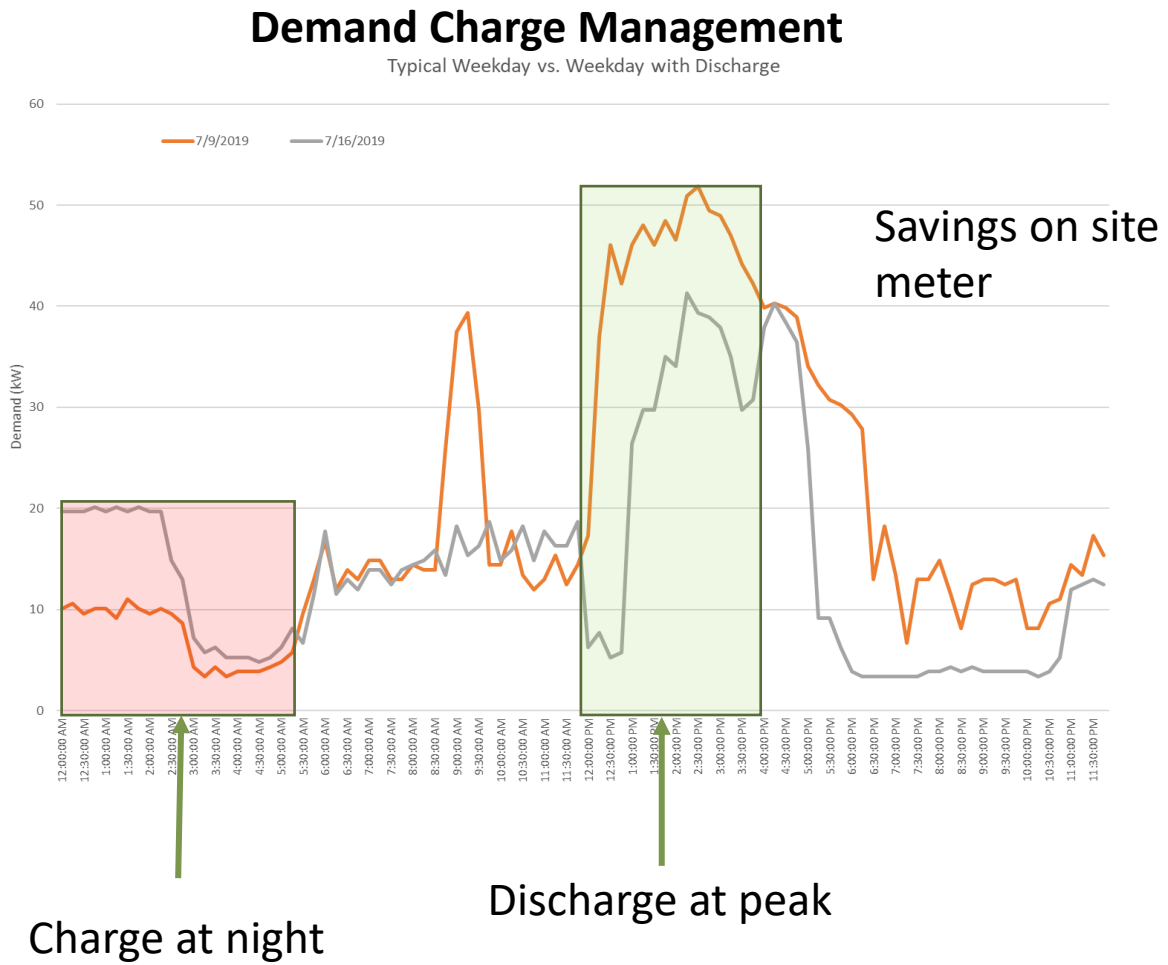
Location: Torrance Unified School District and Napa Valley Unified School District

Vehicles: 2 Blue Bird Type B converted by Transpower with 70kW onboard bidirectional inverter

EVSE: Nuvve PowerPort (3-phase bi-directional AC)

Application: Demand Charge Management Behind the Meter

Utility: Southern California Edison

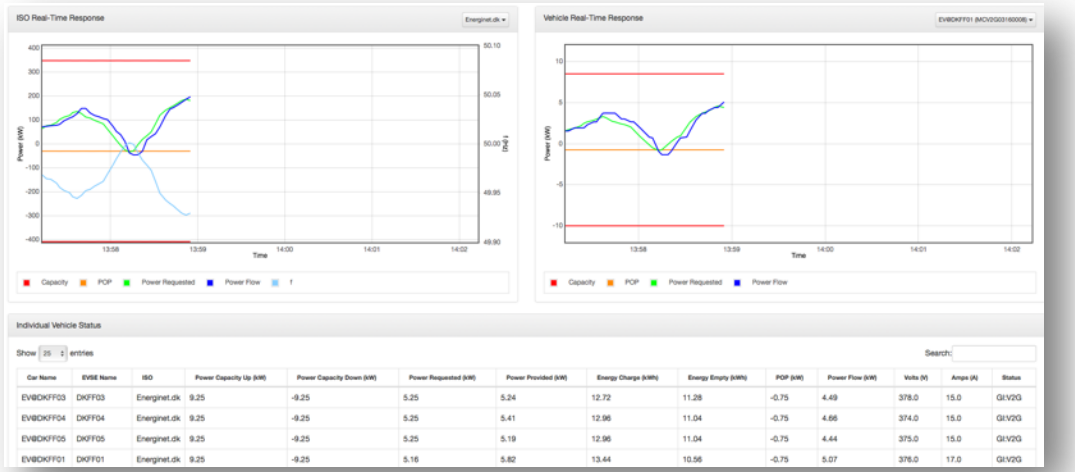


Nuvve V2G Solutions

- Supports cleaner air
- Reduces TCO for Electrification of Transport
- Provides fleet management tools

Thank You

Nuvve GIVe Platform



HIGH LEVEL OF CONTROL

- Integrates variable sized resources (KWh)
- Independent control of each asset (EV)
- Second-by-second control

VERSATILE INTEGRATION

- Third party integrations with existing systems including EVSEs, OEMs, and utilities
- Secure REST API available
- Support for multiple communication protocols

MOBILE MANAGEMENT

- Set charge levels and enable last-minute charging remotely
- Available as a mobile app and web interface

PERFORMANCE INSIGHTS

- 24/7 dashboard view of EV usage and charging
- Live energy delivery performance reporting
- Custom reports

Drivers can adjust charge needs on the go

Monitor your entire fleet with the Nuvve dashboard

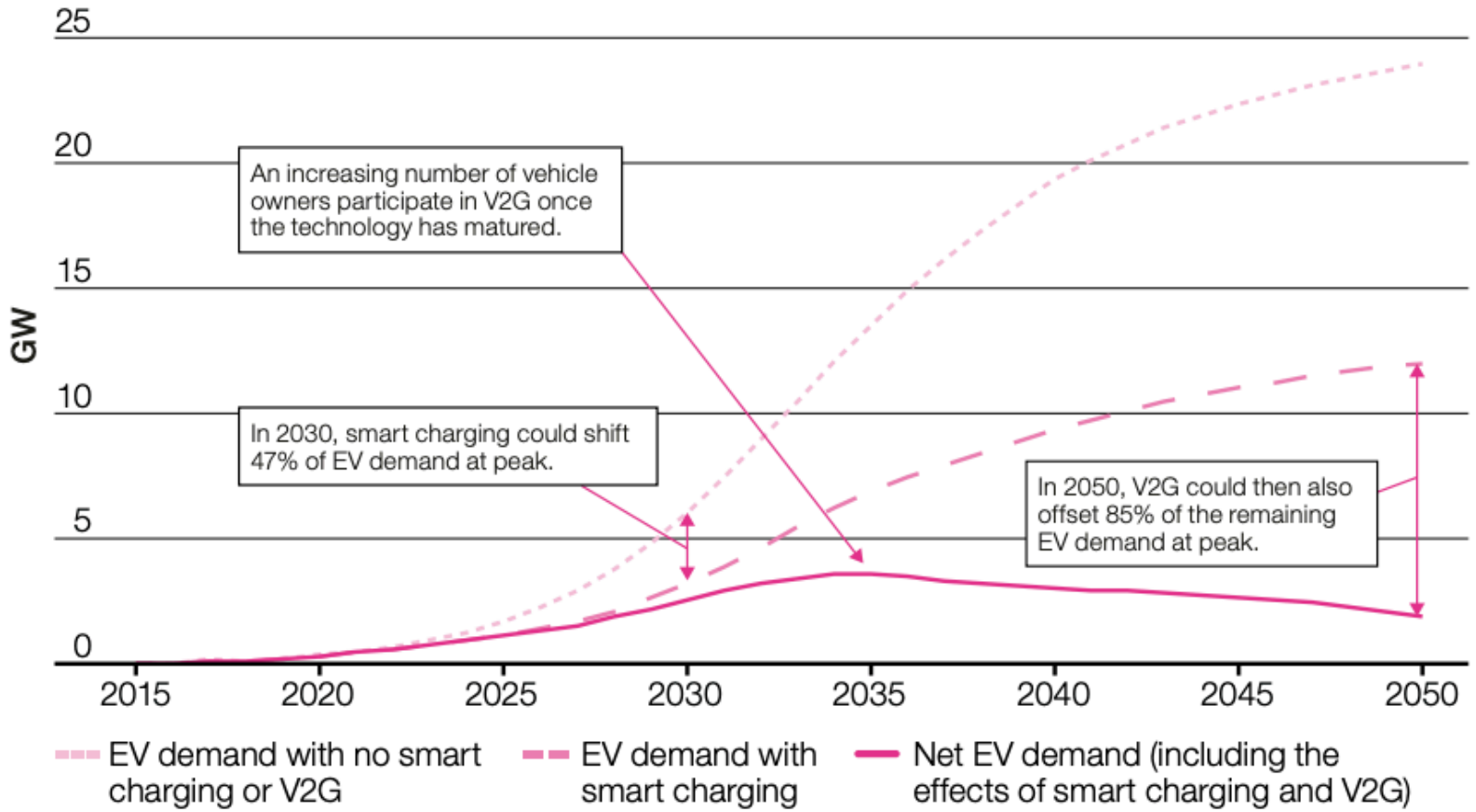
UK Future Energy Scenarios with V2G

Figure 4.24

Electric vehicle charging behaviour at system peak

Community Renewables

nationalgridESO



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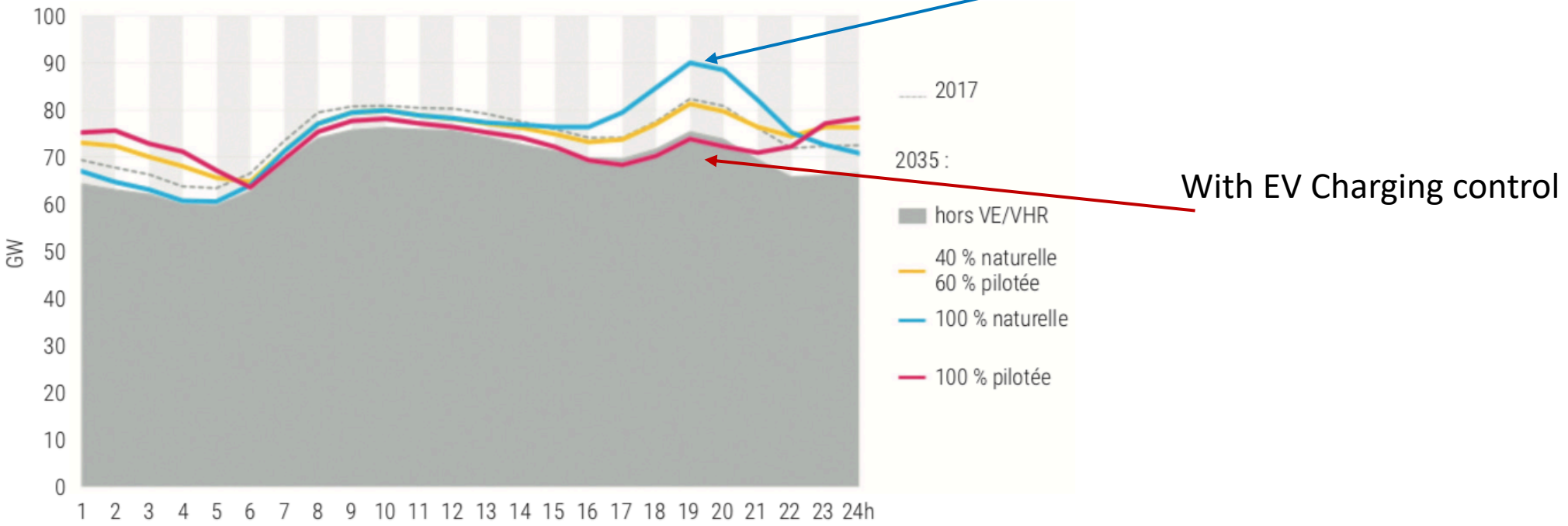
Source: National Grid July 2019: http://fes.nationalgrid.com/media/1409/fes-2019.pdf

France TSO – EV charge impact

Figure 4 Impact du pilotage sur les appels de puissances – simulations avec un parc de 15 millions de VE à horizon 2035, un jour ouvrable de janvier à température de référence



Source : RTE